

Achatina Facula, B.

Testa turrity-ovata, tenui, lævigata, irregulariter striatula, translucēte, nitida, pallide fulvo-cornea; spira turrity-conica, apice obtuso, sutura profundiuscula, irregulariter vix crenulata; anfractibus $7\frac{1}{2}$, subconvexis, ultimo $\frac{2}{5}$ testæ vix attingente, antice leviter remote plicato-striato; apertura subverticali, semiovali, columella breviter valde arcuata, callosa, basi oblique truncata, peristomate recto, tenui, marginibus callo tenui junctis.

Long. 18, diam. 8 mill.; apert. 7 mill. longa, $4\frac{1}{2}$ lata.

Syn. *Ach. Perrotteti*, Conch. Icon. pl. 21. f. 102, nec Pfr.
Habitat in montibus Nilgherries, T. Jerdon.

Intermediate in form between *A. Oreas* and *A. Hügelii*, Pfr., this shell was, in the 'Conchologia Iconica,' confounded with *A. Perrotteti*, Pfr., which proved to be a more elongated form, of which *A. Nilagirica*, B., fig. 87 of the same plate, is a lengthened variety. Pfeiffer cites fig. 102, with a mark of doubt, under *A. Perrotteti*, in the third vol. of his Manual.

The number of Nilgherry species of *Achatina* now amounts to nine, or two less than those described from the Island of Ceylon.

May 1, 1860.

Note. An *Achatina*, described (without a name) by Capt. T. Hutton in the 3rd vol. of J. A. S. Calcutta, was found by him between Mhow and Nimuch. It equals *A. tenuispira* in length, and appears to be a distinct species.

L.—On the Nomenclature of the Foraminifera.

By W. K. PARKER, M. Micr. Soc., and T. R. JONES, F.G.S.

[Continued from p. 298.]

19. *Spirolina*, Ann. Mus. v. p. 244; Hist. An. s. Vert. vii. p. 601. *Spirolinites depressa*. Ann. Mus. v. p. 245; viii. p. 62, f. 14; Hist. An. s. Vert. vii. p. 602, No. 1. "Fossil; Grignon."

This is a *Peneroplis planatus*, F. & M. sp. The right-hand figure is nearly orbicular, and may represent a *Peneroplis* in its Dendritine condition; the other is more complanate, with outspread chambers.

20. *Spirolinites cylindræca*. Ann. Mus. v. p. 245. No. 2; viii. pl. 62. f. 15; Tabl. Enc. Méth. pl. 465. f. 7 a-c, and pl 466. f. 2 a, b; Hist. An. s. Vert. vii. p. 603, No. 2. "Fossil; Grignon."

Endless modifications of the constricted and crozier-like forms*

* *Spirolina stenostoma*, Deshayes (in Lyell's 'Principles,' pl. 4. f. 15-18, and 'Manual,' 5th edit. fig. 237), is one of these lituate varieties, narrow and somewhat flattened.

of *Peneroplis* (scarcely two alike) are to be found in the Grignon Tertiary deposits, and also, at the present day, in the deeper waters of warm latitudes. The broad nautiloid *Peneroplides* indicate shallow water.

Some of the Grignon deposits appear to have been formed in shallow water; other beds are such as may be met with in the Red Sea, at from 300 to 500 fathoms. Those beds, however, that are rich in large specimens of *Foraminifera* have their parallel very exactly in the deposits of the coral-lagoons and reef-margins of the Australian Seas.

21. *Spirolinites cylindracea*, β . Ann. Mus. v. p. 245; viii. pl. 62. f. 16 *a, b*.; Tabl. Enc. Méth. pl. 466. f. 3 *a, b*; Hist. An. s. Vert. vii. p. 603. "Fossil; Grignon."

This has no relationship with the foregoing. It is a variety of another and very distinct species, and is of extreme interest among Foraminifers, being, as it were, an uncoiled and almost uniserial, dimorphous form of *Valvulina triangularis*, D'Orb. The typical form of *V. triangularis* is a triserial, three-sided, pyramidal shell, taking three cells to make a turn of its spire, and having its aperture furnished with a peculiar tongue-like flap or valve, as seen in D'Orbigny's Model No. 25.

Valvulina has a sandy shell. Many Foraminifers figured and described by authors as *Valvulinæ* are *Rotaliæ*. Some of the regular forms of *V. triangularis* closely resemble *Verneuilina tricarinata* (a subspecific form of *Textularia agglutinans*).

When the trifacial compression of the shell becomes obsolete, a close approach is made to *Textularia Trochus*, which, however, has but two cells in one turn of the spire. A small specimen of this variety is figured by us in the Ann. Nat. Hist. 2 ser. xix. pl. 11. f. 15, 16. This trochoid form of *Valvulina* is sometimes extremely depressed, and becomes scale-like and flat, resembling some *Rotaliæ*. Williamson has described and figured such a form under the name of *Rotalina fusca*, Monogr. p. 55, pl. 5. f. 114, 115.

Other varieties, on the contrary, widely differ in shape, the triangular portion being obsolete, and the several chambers of which the shell is composed, failing to make one coil of the spire, form an obliquely semioval shell, having a broad, flat, oblique septal plane, with a large valve. This valve, sending processes of shell-matter over the great crescentic aperture, converts the usually simple passage into a semilunar series of subquadrate passages. Here we have an isomorph of *Bulimina variabilis*, D'Orb. Our specimens are undescribed, and come from the Norwich Chalk and the Grignon Tertiary; some also occur recent in Australia.

V. triangularis has sometimes a tendency in its later cham-

bers, after having developed the triangular portion, to become dimorphous, taking on a new character of growth—namely, that seen in *Bulimina*, where several oblong parallel cells are taken up in the formation of the round advancing coil. Specimens showing the combination of Verneuline and Bulimine growth occur fossil at Grignon and recent in Australia. In many specimens, however, the triangular growth is masked, and the peculiar valve of the aperture is required to aid us in discriminating the varieties of *Valvulina* from those of *Bulimina*. Such a one is the *V. gibbosa*, D'Orb. (Mém. Soc. Géol. France, iv. p. 38, pl. 4. f. 1, 2).

Besides these short and variously coiled *Valvulinæ*, there are others, taking long or claviform shapes, resembling nails. Of these elongate varieties one is figured in Lyell's 'Principles of Geology,' pl. 4. f. 12–14, and 'Manual,' 5th edit. f. 239 (*Clavulina corrugata*, Desh.). The valve is well shown in the drawing, and the chambers may be seen to pass from a triserial to a uniserial arrangement, still fitting obliquely on each other. Between this and the typical *V. triangularis* there is a regular series of gradation. A neater form than *C. corrugata* is the *C. Parisiensis*, D'Orb. (Modèles, No. 66); in the specimen modelled, the large round terminal aperture has accidentally lost its valve-like process. The chambers of the produced part are here conformably adapted one to another, and there is a marked distinction between the triserial and uniserial portions. Sub-varieties of this form are common, not only in the Grignon deposits, but also recent in the Indian and Australian seas.

A modification of *Valvulina* nearly allied to *C. Parisiensis* is the *C. angularis*, D'Orb., Ann. Sc. Nat. vii. p. 268, pl. 12. f. 7 (figured also as *C. tricarinata*, D'Orb. For. Cuba, pl. 2. f. 16–18). This variety, which also is an inhabitant of the eastern seas, differs mainly from the last in attaining a much larger size, and in keeping a tricarinate form throughout its length. A still nobler *Clavulina*, but having five carinæ along its uniserial portion, is common in company with the last two in the shelly deposits of the coral-reefs of Australia.

The specimen figured by Lamarek is a long *Clavulina* closely related to those above mentioned; but it presents us with an extreme development of the uniserial chambers, the coiled portion being nearly obsolete. By D'Orbigny this shell is named *Nodosaria* (*Orthocerina*) *Clavulus* (Ann. Sc. Nat. vii. p. 255), and is represented by his Model No. 2. This model fails to exhibit the slightly coiled commencement, which is constant in this variety, and some traces of which may be recognized in Lamarek's sectional view of the shell (Tabl. Enc. Méth. pl. 466. f. 3 b). This is a common Foraminifer at Grignon.

The name *V. triangularis* is well adapted as a specific appellation, including all the many varieties here indicated, because a tendency to triangularity is continually showing itself in some degree or other in most of the forms, however aberrant.

There are many other Clavuline forms of *Foraminifera* besides those belonging to *Valvulina*. For instance, some arise out of *Textularia*, others out of the Verneuiline subspecies, and others from *Uvigerina*. The claviform varieties of *Textularia* (biserial in their commencement) have been classed by D'Orbigny as *Bigenerinae*, including *Gemmulina*. Those related to *Verneuilina*, which have a triserial arrangement at first (whether inflated or angular), have been classed by D'Orbigny under his genus *Clavulina*; and of these *C. communis*, D'Orb., is a good example. The Uvigerine *Clavulinae* are exemplified by *Uvigerina nodosa*, var. β , D'Orb., Ann. Sc. Nat. vii. p. 269; Sold. Test. ii. pl. 4. fig. *g*.

22. *Miliola**. Ann. Mus. v. p. 349. Lamarck possessed many specimens of *Miliola* from the Mediterranean and from the Calcaire grossier of Paris. The fossil forms he termed *Miliolites* † (*op. cit.* p. 351). As there is no generic distinction between the recent and fossil forms, the name *Miliola* ‡ is sufficient.

In a paper in the 'Microscopical Transactions' (Quart. Journ. Microsc. Sc. No. 23) the *Miliolae* are shown to comprise a vast number of forms not susceptible of specific limitations among themselves; although, for the sake of convenience, the names *Uniloculina*, *Biloculina*, *Triloculina*, *Quinqueloculina*, *Spiroloculina*, *Cruciloculina*, *Hauerina*, *Allomorphina*, *Adelosina*, and others are more or less serviceable as subsidiary terms for the different subspecific groups. We have already noticed that *Miliola* (*Quinqueloculina*) *Seminulum*, Linn., is the type-species (Ann. Nat. Hist. 3 ser. iii. p. 480).

The *Miliolae* belong to the "Agathistègues" of D'Orbigny, and the *Plicatilia* of Ehrenberg. They form an important group among the "opaque-shelled" *Foraminifera*.

Miliolites ringens. Ann. Mus. v. p. 351, No. 1; ix. pl. 17. f. 1; Hist. An. s. Vert. vii. p. 612, No. 1. "Fossil; Grignon."

This is a *Biloculina*, abundant both in the Tertiary and the present seas. Its best development is on sandy and clayish bottoms, at from 30 to 100 fathoms. D'Orbigny figures very fine specimens in the 'For. Foss. Vien.' and in other Monographs,

* Thus called by Lamarck from the resemblance to a millet-seed (*Panicum miliaceum*), *loc. cit.* p. 850.

† Denys de Montfort subsequently applied this term to an *Alveolina* (Conch. Syst. i. p. 174).

‡ Some authors have modified this term, making it "Miliolina," to be in harmony with the majority of D'Orbigny's generic appellations.

under various names. This is the *B. bulloides*, d'Orb., Ann. Sc. Nat. vii. p. 297; Modèles, No. 90; also the *Pyrgo laevis*, DeFrance, Dict. Sc. Nat. Zool. pl. 88. f. 2, 2 a, 2 b.

23. *Miliolites Cor-anguinum*. Ann. Mus. v. p. 251, No. 2; ix. pl. 17. f. 3 a-c; Hist. An. s. Vert. vii. p. 612, No. 2. "Fossil; Grignon" (and Fontenai-Saints-Pères, near Mantes, according to DeFrance, Dict. Sc. Nat. xxxi. p. 68).

A well-developed form of *Triloculina*, of considerable size and well grown. This is one of the most globular of the trigonal varieties. It may be found in most warm seas, at no great depth. It is common in the Tertiary deposits.

One of Lamarck's figured specimens appears to be ornamented with striæ or with riblets.

24. *Miliolites trigonula*. Ann. Mus. v. p. 351, No. 3; ix. pl. 17. f. 4; Hist. An. s. Vert. vii. p. 612, No. 3; *M. Cor-anguinum*, Tabl. Enc. Méth. pl. 469. f. 2 a, b, c. "Fossil; Grignon."

This is the same as *Triloculina Cor-anguinum*, except that the sides are less convex, the lobes or segments of sarcode being thinner. It is represented by D'Orbigny's Model No. 93.

Modified forms with flattened and even hollowed sides (such as *T. tricarinata*, d'Orb. Modèles, No. 94) are frequently met with.

Besides the smooth varieties, there are many others of the same shape, but having ribbed or pitted surfaces.

As the *T. trigonula* is copied in the 'Tabl. Enc. Méth.,' and there termed *T. Cor-anguinum*, it is evident that Lamarck recognized the close relationship of these two forms.

25. *Miliolites planulata*. Ann. Mus. v. p. 352, No. 4; Hist. An. s. Vert. vii. p. 613, No. 4. Three varieties. "Var. α , fossil, from Louvres, near Paris: β , fossil, Grignon; recent, Corsica: γ , fossil, Grignon." (A larger variety from near Hesse-Cassel, according to DeFrance, Dict. Sc. Nat.)

Three forms of *Spiroloculina*, common in the recent and fossil state. Var. α is more flattened than β ; and γ is still thinner, and is keeled. The last is one of the most attenuated of the *Spiroloculinæ*.

S. planulata is the oldest trivial name given to any form of this supposed genus. We have here the same shell as the *S. depressa*, D'Orb.

26. *Miliolites saxorum*. Ann. Mus. v. p. 352, No. 5; ix. pl. 17. f. 2; Tabl. Enc. Méth. pl. 469. f. 3 a, b, c*. "Fossil; Mont Rouge, near Paris."

This is a *Quinqueloculina*, of a peculiar habit. D'Orbigny

* Fig. 3 c is the *M. opposita*, Lam. Ann. Mus. v. p. 353; but it is (probably quite correctly) here collocated with *M. saxorum*, D'Orb.

illustrates it (under the name of *Q. saxorum*) by his Modèle 33, and in the 'Ann. Sc. Nat.' vii. pl. 16. f. 10-14. Its walls are thick, elegantly marked outside with furrow-like pits, and coarsely grooved within (see d'Orbigny's fig. 13), the sarcode bearing but a small proportion to the shell-substance. The aperture is very much contracted, and its tongue is small. Sometimes the internal ridges of the chambers, coming up into the mouth of the shell, and coalescing with the lingular flap, form a sieve-like septal plane. This cribriform condition occurs only in one other subspecies of *Miliola*, namely the *Hauerina* (see the *H. compressa**, D'Orb. For. Foss. Vien. p. 119, pl. 5. f. 25-27).

Fabularia, a somewhat gigantic and nearly allied Rhizopod, built upon the plan of the *Miliolæ*, but having the internal structure of *Alveolina*, also presents this kind of aperture.

Some of the Calcaire grossier is principally made up of *Q. saxorum* and its varieties.

Q. saxorum, unadorned with pitting, is not uncommon among the coral-reefs of the warm seas of Australia and New Zealand. Other forms, with modified ornament (such as *Q. zigzag*, D'Orb. For. Foss. Vien. pl. 19. f. 16-18) are not uncommon. Defrance remarks that a recent *Miliola*, resembling *Q. saxorum*, had been received from New Holland (Dict. Sc. Nat. xxxi. p. 69).

27. *Miliolites opposita*. Ann. Mus. v. p. 353, No. 6; ix. pl. 17. f. 5. "Fossil; Pontoise." (Grignon and Piedmont, Defrance, Dict. Sc. nat. xxxi. p. 69.)

This is a slightly modified individual of *M. saxorum*. The figure is placed with those of the latter, and included under the same name, in the Tabl. Enc. Méth. pl. 469. f. 3.

28. *Miliolites birostris*. Ann. Mus. v. p. 355, No. 7. "Fossil; Chaumont." Apparently a very small, delicate, elongate variety of *M. saxorum*, such as we find extremely common in the Parisian Tertiary beds.

29. *Renulina*. Ann. Mus. v. p. 353; Hist. Anim. s. Vert. vii. p. 605. *Renulites opercularia*, Ann. Mus. v. p. 354; ix. pl. 17. f. 6. *R. opercularis*, Tabl. Enc. Méth. pl. 465. f. 8. "Fossil; Grignon."

This is a rare form of *Vertebralina*, under an extreme varietal condition. Resembling at first sight an *Orbiculina*, or something that might possibly be a *Peneroplis*†, the true character

* D'Orbigny has figured this as having one small oval aperture surrounded by large granules; but in reality these latter are elevations around small passages which have probably been filled up by fossilization. We have *Hauerina* from the Indian, Australian, and other tropical seas.

† It is catalogued as *Peneroplis opercularis* by D'Orbigny, Tabl. Céph. Ann. Sc. Nat. vii. p. 286, No. 6. *Renulites* and *Renulina* appear as synonyms of *Peneroplis* in Williamson's 'Monograph,' p. 44, and in other works.

of the specimen figured by Lamarck has escaped the critical investigation of the many writers on *Foraminifera*. It was only when we met with an individual (and that unique) in the rich collection of Tertiary shell-sands belonging to Sir C. Lyell that we found that this suborbicular shell, well characterized by Lamarck's figure, was an almost cyclical variety of *Vertebralina*. Accustomed as we are to the elongate, articulate, and crozier-like forms of *Vertebralina* (including *Articulina*), it is difficult, without having a wide experience of their varieties, to recognize the true relations of the form under notice. In one direction, *Vertebralina* is modified, in its weaker growths, by a disposition to exhibit simple rectilinear forms, with out-drawn equal-sized chambers, giving a rod-like shape. In this case the primordial chamber is long and tube-like,—a rare feature in *Foraminifera*. The next step is taken by the primordial chamber being subglobular, the second chamber being laid on it as a semilune, and followed by rectilinear chambers. In further gradations more and more chambers are arranged spirally (two, three, or four completing the whorl) around the first chamber, before the Articuline growth commences, whether this latter assumes the rod-like or the Vertebraline condition. Arrests of development at the spiral condition are not uncommon in any of these forms: thus we have among others the broad *Vertebralina Cassis*, D'Orb. For. Cuba, pl. 7. f. 14, 15.

The growth of a linear succession of chambers from the spiral base is the normal habit of *Vertebralina*, the anterior end of each chamber usually presenting an elegantly curved outline, with a somewhat outspread or recurved margin. In this dimorphous condition we have usually from two to five of these forth-growing chambers, which are either subcylindrical, more or less depressed, or broadly flattened, and either longer than broad, subquadrate, or transversely oblong. It is the extreme opening-out, or transverse extension, of these wider and short chambers that leads us to the lateral outgrowing and overlap of the very narrow and transversely elongate chambers in *Renulites opercularia*, which, by the successively increasing length of its symmetrical, concentric, linear chambers, with their incurved ends turned towards the spire, and overlapping the edges of the older chambers, attains this very rare subcyclical form, flat, kidney-shaped, and resembling the operculum of some minute Gasteropod.

Vertebralina is one of the *Agathistegia*, white, opaque, and non-tubuliferous. It is nearly allied to *Miliola* on one hand, and to *Cornuspira* on the other. In the specimens under notice, simple as is the form of the typical shell (*V. striata*, D'Orb.), we have indications of an affinity to the cycloidal *Orbiculina* and

Orbitolites, also belonging to the family which includes the *Miliolitidæ* and their allies.

The aperture in *Vertebralina* consists merely of the simple opening at the end of the chamber, unaccompanied by any valvular flap; so that in *V. opercularia* the aperture is a slit along the peripheral margin of the last, nearly circular, chamber.

The surface in *Vertebralina* is marked by delicate striations, which, though attaining the strength of ribs in the thick-walled and more strongly characterized shells, such as *V. mucronata*, D'Orb. (For. Cuba, pl. 7. f. 16-19), become obsolete, but are very rarely absent, in the more delicate specimens. In *V. opercularia* delicate striæ are visible on the early chambers. Notwithstanding the striation, the surface in *Vertebralina* is usually beautifully smooth and opalescent. It is also occasionally pitted (as in some fossil specimens from Grignon)—a feature very constant in *Orbiculina*.

V. striata, var. *opercularia* is known only in the fossil state. Lamarck's specimen was from Grignon; our specimen is from Hauteville*. It is on the shores of Australia that we find *V. striata* making the nearest approach to *V. opercularia* amongst its living varieties.

30. *Ovulites elongata*. Tabl. Enc. Méth. pl. 479. f. 8; Hist. An. s. Vert. ii. p. 194, No. 2. "Fossil; Grignon."

This is an elongate-cylindrical variety of *O. Margaritula*. See above, page 291.

31. *Dactylopora cylindræa*. Hist. An. s. Vert. ii. p. 189. "Fossil; Grignon."

This is figured by Blainville and DeFrance, Dict. Sc. Nat. Zooph. pl. 47. f. 4 (thick variety), pl. 48. f. 1 (delicate variety†). D'Orbigny has recognized it as a Foraminifer (Cours Elém. Pal. et Géol. ii. p. 192); but he has grouped it with his "Monostègues," and regarded it as a congener of *Ovulites*, for which determination there are not the least grounds, as its structure is very complicate, and to some extent allied to that of *Orbitolites*. Bronn, in the third edition of the 'Lethæa Geognost.,' places *Dactylopora* and some other forms between the *Foraminifera* and the *Bryozoa*. We may especially refer to this valuable work for the synonymy of *D. cylindræa* and *D. elongata* (*op. cit.* vol. i. pp. 256, 257), and for a list of the localities where they have been collected in France and Belgium.

a & *b*. Varieties *D. eruca* and *D. digitata*. In the East Indian and other tropical seas we have met with some curious small

* Since writing the above, we have met with several specimens nearly approaching in form to *V. opercularia* in a sample of Grignon shell-sand.

† This is termed *Polytrype elongata*, but is merely a smaller, more slender, and less worn specimen of *D. cylindræa*.

Foraminifers presenting the aspect of a little half-ring, formed of four or more thick-walled, hollow, subquadrangular segments, arranged side by side semicircularly, each chamber opening by a nipple-shaped aperture on the concave surface of the half-ring, and communicating with its neighbour by a rather large sub-central aperture in the septal face. The shell-structure resembles that of the "opaque" Foraminifers. The surface of this semi-annular shell is nearly smooth and rather polished, and is sulcated at the junctions of the chambers. Rarely is the half-ring truly semicircular, the segments being often arranged on a gently curved line, and offering a resemblance to a slightly bent larva or caterpillar. Such a form as this (which we term *Dactylopora eruca*) is also found in some of the French Tertiaries; and here, besides this pupoid form, a still greater departure from the ring-shape is made sometimes by the cells becoming short cylinders perforated at both ends, partially separated one from another, and something like fragments of *Tubulipora* or *Cellipora*. This is our variety *D. digitata*.

c & *d*. Varieties *D. annulus* and *D. marginoporella*. In the Calcaire grossier of Grignon and other Tertiary deposits we find these demi-rings, and also numerous little perfect rings, having the same structure as the less perfect half-ringed shells. Of these annular forms, some present neatly packed chambers, and others divaricating subtubular chambers. A specimen of the latter has been figured and described by Michelin (Icon. Zooph. p. 177, pl. 46. f. 27) under the name of *Clypeina marginoporella*. The former variety we name *D. annulus*.

e. Var. *D. reticulata*. Besides these, there are in the Calcaire grossier of France, and in the Miocene beds of San Domingo, compound forms, made up of two or many such rings, mounted one on another symmetrically, each junction being marked by a regular series of minute round holes left by the apposition of the septal sulci of the two rings. The shell-substance between the cells is thick; but the outer wall of the chambers, being thinner, is frequently worn away, so that the specimens present large pits or openings beside the junctural interspaces. This variety is the *Larvaria reticulata* of DeFrance, Dict. Sc. Nat. xxv. p. 287.

f. Var. *D. perforata*. There is a variety of *Dactylopora*, in the Grignon shell-sand, which much resembles *D. reticulata*; but the cells open outwards as well as inwards. Hence we term it *D. perforata*. The apertures, both external and internal, are large and lipped; the former are in the centre of the thin outer cell-wall, and present superficially nearly regular circles of pustulous openings. The interseptal spaces are, as a rule, hidden in this form.

g. Var. *D. glandulosa*. Vicomte d'Archiac has figured and described a fossil Microzoon (*Prattia glandulosa*, Mém. Soc. Géol. France, 1850, iii. p. 407, pl. 8. f. 20; Bronn, Leth. Geognost. 3rd edit. i. p. 28, pl. 35³. f. 28) from the Eocene beds of Biarritz, which appears to us to be a *Dactylopora*, bearing the same relation to *D. reticulata* as *D. marginoporella* does to *D. annulus*, and *D. digitata* to *D. eruca*. We can easily suppose rings of loosely set chambers piled one on another, and, instead of forming the neat, cylindrical, cane-like form of *D. reticulata*, presenting a subcylindrical hollow body, externally roughened by numerous vesicular projections, and occasionally intersected by faint annular rings—indicative, as it were, of periodicity of growth. It is thus that we interpret the specimen alluded to; and we propose to recognize it as the variety *D. glandulosa*.

h. Var. *D. polystoma*. Another variety, from Grignon, illustrative of the transitional characters of *Dactylopora*, has three or more apertures to each cell (hence its proposed name *D. polystoma*). Besides the single internal mouth, opening into the hollow cylinder of this compound shell, there are externally at least two apertures, strongly labiate,—one opening near the base, and the other at the top of the cell. In the first or earliest ring of cells, only the upper row of openings is present. The fine specimen from which our observations were made is curved, and the convex side shows at several places the interseptal passages; where these are not visible, the rows of upper and lower apertures of contiguous cell-rings form distinct annular bands, between which the outer wall of each cell is boldly defined, and often broken through; so that three kinds of superficial perforations here tend to perplex the observer.

i. *D. Bambusa* (type). The stages through which *Dactylopora* passes in attaining its most compound condition are very curious, and not, at first, readily followed. We may describe them thus:—

In each of the original cells the exterior apertures become tubular, and arise from the sides, not from the outer part of the cell. Next we see the cells giving off three or more stolons (from the side and rather towards the neck), which pass through the thick shell, and open as simple round apertures on the surface, which is also characterized by annular rows of much larger passages, the latter being the junctural interspaces. This form we call *D. Bambusa*.

j. Var. *D. cylindracea*. Moreover, we find in some specimens that each of the original cells has produced from its outer surface, or fundus, a new oval or subglobular chamber, larger than itself,—the neck of the new chamber being closely adapted

to, or embracing the exterior of, the old cells. These added cavities do not appear to communicate with the surface, the shell-wall being thick. The stolon-tubes arising from the sides of the original innermost chambers pass by the sides of the great medial cæca, and terminate in small, subglobular, peripheral cells, opening by simple round apertures on the outer surface. The junctural interspaces are hidden in this highly complicate form, which is the *D. cylindræa* of Lamarek. *Polytrype elongata* of Defrance is a more attenuate variety.

These larger cylindrical forms, which are not uncommon in the Grignon deposits, present essentially the same conformation as the simpler varieties before described, with the exception, however, of the peculiar added structure, consisting of large cæcal cells and numerous smaller cells, the latter arranged quincuncially over the whole of the exterior of the cylinder, and hiding the junctural interspaces, which still remain visible in the interior. The cylinder narrows itself towards the ends, thus becoming fusiform.

The surface of the external or superadded series of chambers, when perfect, is smooth, and marked by the regularly-arranged round apertures; but when worn (as is very frequently the case), the outer cell-walls disappear, leaving smooth cup-shaped hollows, each perforated at the bottom with the canal of the connecting stolon. The quincunx gives visually a hexagonal or honeycombed appearance to the worn surface. When the passages between the first chambers and the exterior exist as tubes only (as in *D. Bambusa*), the worn surface has a pitted aspect; and in other varieties several different complications of large and small apertures are seen in worn specimens. In the figure of a very large specimen of *D. cylindræa*, from Grignon, given by Goldfuss (pl. 12. f. 4), we see carefully drawn a quincuncial lattice of the worn cells, with small interspersed openings of supernumerary pseudopodial passages from primary cells. This character is not given in Defrance's figures, nor have we yet met with it in our own specimens.

Lamouroux figures and describes a large specimen under the name of *Reteporites digitalia* (Polyp. p. 44, pl. 72. f. 6-8).

Michelin's *Uteria Encrinella* (Icon. Zooph. p. 177, pl. 46. f. 26), from the Eocene beds of Cuisse-Lamotte (Oise) is a specimen of *D. cylindræa*, presenting an unusual shortness of cylinder, evidently perfect and unworn.

Michelin's *Turbinia graciosa* (Icon. Zooph. p. 177, pl. 46. f. 15), from Grignon and Cuisse-Lamotte, appears to be a short *D. cylindræa*, which, after having developed a few normal circles of compound cells, was finished off with a converging series of less complex cells.

In some unequally grown *Dactylopora* we can trace the co-existence of the more compound with the simpler form of structure. Thus in some tapering specimens we can discern in the thicker part that the large cæcal cells have been developed, which are characteristic of *D. cylindracea*, whilst the cæca gradually diminish and disappear in the constricted portion, which approaches in its structure to that of *D. Bambusa*.

All these peculiar organisms, recent and fossil, are related within specific limits, the passage from the simple to the compound being step by step, and not unlike similar transitions and gradual complications seen in *Orbitolites* and others of the "opaque" *Foraminifera*. According to our plan of choosing for the type of a species the form furthest removed from extremes, and yet indicating the main essentials of the structural features of the whole specific group, we select *D. Bambusa* for the typical form.

The structural details of *Dactylopora* deserve full attention: the brief descriptions given above are but indications of its peculiar construction.

Besides the French and Belgian Eocene Tertiaries, the Miocene beds of San Domingo yield *Dactylopora*.

[To be continued.]

LI.—*Mollusca Japonica: New Species of Chrysallida and Parthenia.* By ARTHUR ADAMS, F.L.S., &c.

THE Sea of Japan appears to be as well stocked with the smaller species of *Pyramidellidæ* as the seas of Europe. The reason why Clark speaks of this family as a "truly British group, which far outnumbers the discoveries of any other country," is that these little Mollusks live in comparatively deep water, and no naturalist has hitherto brought them to light. By some hard work and perseverance I have discovered many new *Mollusca* in different parts of the world, and I shall now describe eight species of *Chrysallida* and three of *Parthenia* from Japanese waters. In another communication I shall give descriptions of some new species of the allied genera, such as *Turbonilla*, *Odostomia*, *Dunkeria*, *Aclis*, and *Ebala*. Some of these forms may be found also in the China Sea, as I frequently meet with examples of species which are common to the south and the north of the Korea Strait.

N.B. In a former paper I gave the name *Huxleyia* to a new genus of bivalve *Mollusca*. Should, however, this name have